भारतीय मानक
Indian Standard

IS 1165 : 2022

संपूर्ण दूध पाउडर — विशिष्टि

(छटा पुनरीक्षण)

Whole Milk Powder — Specification

(Sixth Revision)

ICS 67.100.10

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Sixth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Dairy Products and Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

The milk production in our country is characterized by seasonal variations and drying of milk, an important method of preservation, facilitates later consumption during the lean season. The dried milk products, thus, have become an essential part of the chain between the producer and the consumer.

This Indian Standard was first published in 1957 and subsequently revised in 1967, 1975, 1986, 1992 and 2002. This revision has been brought out to harmonize the specifications of whole milk powder with the requirements laid down in the *Food Safety and Standards* (*Food Products Standards and Food Additives*) *Regulations*, 2011. In this revision, the following major changes have been incorporated:

a) Title has been modified as 'Whole milk powder';
b) Description of whole milk powder has been revised;
c) Requirement of milk protein in milk solids not fat has been incorporated;
d) Requirement of titratable acidity and its method of test have been revised;
e) *Food Safety and Standards* (*Food Products Standards and Food Additives*) *Regulations*, 2011 have been referred regarding the use of food additives; and
f) Microbiological limits have been aligned with the *Food Safety and Standards* (*Food Products Standards and Food Additives*) *Regulations*, 2011.

While formulating this standard, necessary consideration has been given to the relevant rules prescribed by the Government of India under the *Food Safety and Standards Act*, 2006 and the Rules framed thereunder and the *Legal Metrology* (*Packaged Commodities*) *Rules,* 2011. This standard is however, subject to the restriction imposed under these, wherever applicable.

The composition of the Committee responsible for formulation of the standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

WHOLE MILK POWDER — SPECIFICATION

(Sixth Revision)

1 SCOPE

This standard prescribes the requirements, methods of sampling and test for whole milk powder.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

IS No.	*Title*
1224 (Part 2) : 1977	Determination of fat by the Gerber method: Part 2 Milk products (*first revision*)
2491 : 2013	Food hygiene — General principles — Code of practice (*third revision*)
4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
5401 (Part 1) : 2012/ISO 4832 : 2006	Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms: Part 1 Colony count technique (*second revision*)
5402 (Part 1) : 2021/ISO 4833-1 : 2013	Microbiology of the food chain — Horizontal method for the enumeration of microorganisms — Colony count at 30 °C by the pour plate technique (*third revision*)
5887 (Part 1) : 1976	Methods for detection of bacteria responsible for food poisoning Isolation, identification and enumeration of *Escherichia Coli*
(Part 3/Sec 1) : 2020/ISO 6579-1 : 2017	Horizontal method for the detection, enumeration and serotyping of *Salmonella* Section 1 Detection of *Salmonella* spp. (*third revision*)
(Part 6) : 2012/ ISO 7932 : 2004	Horizontal method for the enumeration of presumptive *Bacillus cereus:* Colony count technique at 30 °C (*first revision*)
(Part 8/Sec 1) : 2002/ISO 6888-1 : 1999	Horizontal method for enumeration of coagulase-positive Staphylococci (*Staphylococcus aureus* and other species), Sec 1 Technique using Baird-Parker agar medium
(Part 8/Sec 2) : 2002/	Horizontal method for enumeration of coagulase-positive
ISO 6888-2 : 1999	Staphylococci (*Staphylococcus aureus* and other species), Sec 2 Technique using rabbit plasma fibrinogen agar medium
10030 : 1981	Methods for sensory evaluation of milk powder
8069 : 1989	High density polyethylene (HDPE) woven sacks for packing pesticides — Specification (*second revision*)
10171 : 1999	Guide on suitability of plastics for food packaging (*second revision*)
11078 : 2012	Round open top sanitary cans for milk powder — Specification (*second revision*)
11124 : 1984	Method for atomic absorption spectrophotometric determination of arsenic
11546 : 2012/ ISO 707 : 2008	Milk and milk products — Guidance on sampling (*first revision*)
11623 : 2008/ ISO 5537 : 2004	Dried milk — Determination of moisture content (reference method)

IS No.	*Title*
11721 : 2013/ ISO 1736 : 2008	Dried milk and dried milk products — Determination of fat content — Gravimetric method (Reference method) (*second revision*)
IS 11765 : 2017/ ISO 6091 : 2010	Dried milk — Determination of titratable acidity (reference method) (*first revision*)
11917 : 2018/ ISO 8968-1 : 2014	Milk and milk products — Determination of nitrogen content — Kjeldahl principle and crude protein calculation (*first revision*)
12074 : 1987	Method for determination of lead by atomic absorption spectrophotometer
12759 : 1989/ ISO 8156 : 1987	Dried milk and dried milk products — Determination of insolubility index
13500 : 1992	Spray dried milk powders — Scorched particles — Determination
13688 : 2020	Packaged pasteurized milk — Specification (*second revision*)
14988 (Part 1) : 2020/ ISO 11290-1 : 2017	Microbiology of food and animal feeding stuffs — Horizontal method for detection and enumeration of *Listeria monocytogenes*: Part 1 Detection method (*first revision*)
16072 : 2012	Method for determination of moisture content in milk powder and similar products
16195 : 2014/ ISO/TS 15495 : 2010	Milk, milk products and infant formulae — Guidelines for the quantitative determination of melamine and cyanuric acid by LC-MS MS
ISO 14501 : 2021	Milk and milk powder — Determination of aflatoxin M_1 content — Clean-up by immunoaffinity chromatography and determination by high-performance liquid chromatography
ISO 14674 : 2005	Milk and milk powder — Determination of aflatoxin M_1 content — Clean-up by immunoaffinity chromatography and determination by thin-layer chromatography
ISO 15213 : 2003	Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of sulfite-reducing bacteria growing under anaerobic conditions

3 REQUIREMENTS

3.1 The product shall be obtained by partial removal of water from milk (for definition and type of milk, *see* **3** and **4** of IS 13688). The fat and/or protein content of the milk may be adjusted by addition and/or withdrawal of milk constituents in such a way as not to alter the whey protein to casein ratio of the milk being adjusted. All processing and drying should be carried out in a manner that minimizes the loss of nutritive value, particularly protein quality. The product shall be free from added whey and whey preparations. The following milk products are allowed for protein adjustment purposes:

3.1.1 *Milk Retentate*

The product obtained by concentrating milk protein by ultrafiltration of milk, partly skimmed milk, or skimmed milk.

3.2 The product shall be of uniform colour. The taste and flavour of the product or of the reconstituted milk shall be pleasant and clean. It shall be free from off flavours (may have slightly cooked but not the burnt flavour) and rancidity. It is recommended that the flavour and taste may be judged on the basis of their sensory characteristics (*see* IS 10030).

3.3 The product shall be free from lumps except those that break up readily under slight pressure. It shall also be free from extraneous matter, vegetable oil/fat, mineral oil, thickening agents, added flavour and sweetening agent.

3.4 The product may contain only permitted food additives within the limits as specified under the *Food Safety and Standards* (*Food Products Standards and Food Additives*) *Regulations*, 2011.

3.5 The product shall also conform to the requirements given in Table 1 and Table 2.

3.6 The pesticide residues, antibiotic and veterinary drug residues, if any, in the product shall not exceed the limits as prescribed in the *Food Safety and Standards* (*Contaminants, Toxins and Residues*) *Regulations,* 2011.

3.7 Heavy metals and other contaminants or toxic substances (aflatoxin M_1 and melamine), if any, in the product shall not exceed the limits specified in Table 3.

Table 1 Requirements for Whole Milk Powder

(*Clause* 3.5)

Sl No.	Characteristics	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Moisture[1)], percent by mass, *Max*	4.0	IS 11623 for reference purpose and IS 16072 for routine purpose
ii)	Total solids[2)], percent by mass, *Min*	96.0	*See* Note
iii)	Milk fat, percent by mass	Minimum 26.0 and less than 42.0	IS 11721 for reference purpose and **5** of IS 1224 (Part 2) for routine purpose
iv)	Milk protein in milk solids not fat, percent by mass, *Min*	34.0	IS 11917[3)]
v)	Insolubility index, *Max*	2.0 ml	IS 12759
vi)	Total ash (on dry basis)[4)], percent by mass, *Max*	7.3	Annex A
vii)	Titratable acidity (lactic acid), as ml of 0.1 N NaOH/10 g solids not fat, *Max*	18.0	IS 11765
viii)	Scorched particle, mg/kg, *Max*	15 (equivalent to Disc B)	IS 13500

NOTES

[1)]The moisture content does not include water of crystallization of the lactose; the milk solids-not-fat content includes water of crystallization of the lactose.

[2)]From the mass of residue, as obtained in the method prescribed in IS 11623 or IS 16072, calculate the percentage of total solids.

[3)]Estimate milk protein content by the method prescribed in IS 11917. Protein content is 6.38 multiplied by the total nitrogen determined. Calculate milk solid not fat percentage by subtracting milk fat and moisture from 100.

Calculate milk protein in milk solid not fat, percent by mass as follows:

$$\text{Milk protein in milk solid not fat, percent by mass} = \frac{\text{Pecent milk protein} \times 100}{\text{Percent milk solids not fat content}}$$

[4)]In case of whole milk powder prepared from camel milk, ash content shall be 8.2 percent, *maximum*.

Table 2 Microbiological Requirements for Whole Milk Powder

(*Clause* 3.5)

Sl No.	Characteristic	Requirement				Method of test, Ref to[2)]
		Sampling Plan[1)]		Limit (cfu)		
		n	c	m	M	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(i)	Aerobic plate count	5	2	3×10^4/g	5×10^4/g	IS 5402 (Part 1)
(ii)	Coliform count	5	2	10/g	50/g	IS 5401 (Part 1)
(iii)	*Staphylococcus aureus* (Coagulase positive)	5	2	10/g	1×10^2/g	IS 5887(Part 8/Sec 1* or 2)
(iv)	Yeast and mould count	5	0	50/g	–	IS 5403
(v)	*Salmonella sp.*[3)]	5	0	Absent/25 g	–	IS 5887 (Part 3/Sec 1)
(vi)	*Listeria monocytogenes*	5	0	Absent/g	–	IS 14988 (Part 1)
(vii)	*Bacillus cereus*	5	3	5×10^2/g	1×10^3/g	IS 5887 (Part 6)
(viii)	*Sulphite reducing clostridia*	5	3	50/g	1 c 10^2 /g	ISO 15213
(ix)	*E. coli*	5	0	Absent/g	–	IS 5887 (Part 1)

NOTES

[1)] For sampling plan see Annex B.

[2)] The method indicated by '*' shall be the referee method.

[3)] The requirement for *Salmonella* shall be tested in a laboratory situated away from the production area.

Table 3 Limits of Heavy Metals and Other Contaminants or Toxic Substances

(*Clause* 3.7)

Sl No.	Contaminant/toxin	Limit	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Lead, ppm, *Max*	0.02 × concentration factor	IS 12074
ii)	Arsenic, ppm, *Max*	0.1 × concentration factor	IS 11124
iii)	Aflatoxin M_1, ppb, *Max*	4.0	ISO 14501 or ISO 14674 or any other international validated method
iv)	Melamine, ppm, *Max*	2.5	IS 16195

NOTE — Concentration factor shall be as communicated by the manufacturer. General guidance for calculation of concentration factor for whole milk powder is given below:

$$\text{Concentration factor} = \frac{\text{Total solids in whole milk } \textit{powder}}{\text{Total solids in source milk}}$$

3.8 Hygienic Conditions

The product shall be manufactured and packed under hygienic conditions as per IS 2491.

4 PACKING

4.1 The product shall be packed in quantities as stipulated under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011 as well as in accordance with requirements under the *Food Safety and Standards* (*Packaging*) *Regulations*, 2018.

4.2 Retail Packing

4.2.1 The whole milk powder shall be packed in clean and sound containers (*see* IS 11078) or in a food grade flexible pack made from a film or combination of any of the substrates made of board, paper, polyethylene, polyester metalized film or aluminium foil in such a way as to protect it from deterioration. The product shall be packed in nitrogen, carbon dioxide or a mixture thereof. The packages shall be hermetically sealed. In case of plastic material, only food grade plastic (*see* IS 10171) shall be used.

NOTES

1 For food grade plastic material, the *Food Safety and Standards* (*Packaging*) *Regulations*, 2018 should also be referred.

2 In the case of flexible pack, the following information shall be marked on the label 'once opened, the entire product content should immediately be placed in a clean air tight container'.

4.2.2 Further encasing of individual retail packs may be carried out in bags/cartons of adequate strength as outlined in **4.3**.

4.3 Bulk Packing

4.3.1 The product may be packed in quantities of 25 kg in bags of food grade polyethylene (*see* IS 10171) of minimum thickness 0.05 mm. The bags should be properly closed by tying with a string or a rubber band or heat sealed and shall be subsequently encased in any of the following:

a) Multi-walled kraft paper, such as crepe kraft paper bags of not less than 80 g/m^2 (GSM) grade, appropriately lined and having two or more inner layers of plain kraft paper of not less than 80 g/m^2 (GSM) grade;

b) Packs made out of 80 GSM (g/m^2) Kraft paper sandwich laminated to high density polyethylene woven fabric having construction as given in Annex A of IS 8069 with 20 GSM (g/m^2) polyethylene; and

c) Any other newer packaging as alternative system provided these have been tested for strength, air-permeability, etc, by a recognized institution and found equivalent to the material specified in **4.3.1** a) and b) above. The material coming in direct contact with the product shall be of food grade.

4.3.2 The bags meant for reconstitution shall be stored below 20 °C and a statement 'Not for direct consumption' but for 'Reconstitution only' shall be made on the package along with the date of manufacture. However, in case the moisture of the product packed in these bags is maintained below 3.5 percent, the bags need not be stored below 20 °C. Such bags shall have to be consumed within five months of their date of manufacture and this shall be given in the form of expiry date.

5 MARKING

5.1 The package shall bear legibly and indelibly the following information:

a) Name of the product and brand name, if any;

b) Name and address of the manufacturer;

c) Type of material;
d) Batch or code number;
e) Process of drying;
f) Month and year of manufacturing or packing;
g) Net quantity;
h) Directions for storage;
j) Expiry/Use by date;
k) Direction for reconstitution;
m) The contents of this container on reconstitution as per the directions have ....litre(s) toned milk;
n) Information given under Note 2 of **4.2.1** if applicable; and
p) Any other requirements under the *Legal Metrology* (*Packaged Commodities*) *Rules,* 2011 and the *Food Safety and Standards* (*Labelling and Display*) *Regulations*, 2019.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material shall be drawn and tested for conformity to this standard as prescribed in Annex C.

ANNEX A

[*Table* 1, *Sl No.* (vi)]

DETERMINATION OF TOTAL ASH (ON DRY BASIS)

A-1 APPARATUS

A-1.1 Flat-Bottom Dish, of stainless steel, porcelain, silica or platinum.

A-1.2 Muffle Furnace, maintained at 550 ± 20 °C.

A-1.3 Desiccator

A-2 PROCEDURE

Weigh accurately 3 g of the material in the dish, previously dried in an air-oven and weighed. Heat the dish gently on a flame at first and then strongly in a muffle furnace till grey ash results. Cool the dish in a desiccator and weigh. Heat the dish again for 30 min in the muffle furnace. Cool the dish in a desiccator and weigh. Repeat this process of heating for 30 min, cooling and weighing until the difference between two successive weighing is less than one mg. Record the lowest mass.

A-3 CALCULATION

Total ash (on dry basis), percent by mass

$$= \frac{100(M_2 - M)}{(100 - M_0)(M_1 - M)} \times 100$$

where

M_2 = mass in g, of the dish with the ash;

M = mass in g, of the empty dish;

M_1 = mass in g, of the dish with the material taken for the test; and

M_0 = moisture, percent by mass, calculated as per IS 11623.

ANNEX B

[*Table* 2]

SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

B-1 SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

The terms n, c, m and M used in this standard have the following meaning:

n = Number of units comprising a sample;

c = Maximum allowable number of units having microbiological counts above m for 2-class sampling plan and between m and M for 3-class sampling plan;

m = Microbiological limit that separates unsatisfactory from satisfactory in a 2-class sampling plan or acceptable from satisfactory in a 3-class sampling plan; and

M = Microbiological limit that separates unsatisfactory from satisfactory in a 3-class sampling plan.

B-2 INTERPRETATION OF RESULTS

2-Class Sampling Plan (where n, c and m are Specified)	3-Class Sampling Plan (where n, c, m and M are Specified)
1. Satisfactory, if all the values observed are ≤ m 2. Unsatisfactory, if one or more of the values observed are > m or more than c values are > m	1. Satisfactory, if all the values observed are ≤ m 2. Acceptable, if a maximum of c values are between m and M and the rest of the values are observed as < m 3. Unsatisfactory, if one or more of the values observed are > M or more than c values are > m

ANNEX C

(*Clause* 6)

SAMPLING OF WHOLE MILK POWDER

C-1 GENERAL REQUIREMENTS

C-1.0 In drawing, preparing, storing and handling samples, in addition to the following precautions and directions, those given in **4** and **13** of IS 11546 should, as far as possible, be observed.

C-1.1 Precautions shall be taken to protect the samples, material being sampled, sampling instrument and the containers for samples from adventitious contamination.

C-1.2 The samples shall be placed in clean and dry glass containers. The sample containers shall be of such a size that they are almost completely filled by the sample. The sample containers shall in addition be sterile when they are used for sample for bacteriological examination.

C-1.3 Each container shall be sealed air-tight after filling and marked with full details of sampling, batch or code number, name of the manufacturer and other important particulars of the consignment.

C-1.4 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

C-2 SCALE OF SAMPLING

C-2.1 Lot

All the containers in a single consignment of same type of material, drawn from a single batch of manufacture and of same size shall constitute a lot. The consignment is declared to consist of different batches of manufacture, the batches shall be marked separately and the group of containers in each batch shall constitute separate lots.

C-2.1.1 For ascertaining the conformity of material to the requirements of this specification, samples shall be tested from each lot separately.

C-2.2 The number of containers to be selected from the lot shall depend on the size of the lot, quantity of material in the container and shall be as given in Table C-1.

C-2.3 These containers shall be selected at random from the lot. In order to ensure the randomness of selection, procedure, given in IS 4905 may be followed.

C-3 TEST SAMPLES AND REFEREE SAMPLES

C-3.1 Preparation of Individual Sample

Draw with a suitable sampling instrument approximately equal quantities of material from different parts of the same container till about 150 g of material is obtained. This shall be divided into three equal parts. Each part so obtained, shall constitute an individual sample representing the container and shall be transferred immediately to thoroughly clean and dry containers sealed air-tight with the particulars given in **C-1.3**. The individual sample so obtained shall be divided into three sets kin such a way that each set have a sample representing each selected container. One of these sets shall be marked for the purchaser, another for the vendor and the third for the referee.

C-3.2 From the selected containers, select a sub sample according to col 3 or col 6 of Table C-1, as the case may be. Draw with a suitable sampling instrument which is sterile, at least 100 g of material and mix thoroughly under aseptic conditions to form sample of container for microbiological examination (for guidance and details, *see* **13.3.2** of IS 11546). Divide sample taking care not to bring any microbiological contamination in the material into three equal parts. Each part so obtained shall constitute a sample representing the container and shall be transferred to a sterile glass container, sealed air-tight and labelled with particulars given in **C-1.3**. They shall be marked, in addition, with the words ‘For Microbiological Examination’. The samples so obtained shall be divided into three sets in such a way that each set has a sample. representing each selected container. One of these sets shall be marked for the purchaser, another for the vendor and the third for the referee.

C-3.3 Reference Samples

Referee sample shall consist of a set of individual sample (*see* **C-3.1)**, composite sample (*see* **C-3.2**) and a set of samples for microbiological examination (*see* **C-3.3**) marked for this purpose and shall bear the seals of the purchaser and the vendor. These shall be kept at a place as agreed to between the purchaser and the vendor so as to be used in case of a dispute between the two.

Table C-1 Number of Containers to be Selected for Sampling

(*Clauses* C-2.2 *and* C-3.2)

For Containers of 500 g and Up to 5 kg			For Containers of more than 5 kg		
Number of Containers in the Lot	Sample size		Number of Containers in the Lot	Sample size	
	For Tests other than Microbiological Tests	For Microbiological Tests		For Tests other than Microbiological Tests	For Microbiological Tests
(1)	(2)	(3)	(4)	(5)	(6)
Up to 100	3	1	Up to 50	2	1
101 to 300	5	2	51 to 100	3	1
301 to 500	7	3	101 to 300	4	2
501 and above	9	4	301 and above	5	3

C-4 NUMBER OF TESTS

C-4.1 Tests for the determination of moisture, total solids, insolubility index, total ash and fat shall be conducted on each of the samples consisting a set of the sample.

C-4.2 Tests for flavour, odour and titratable acidity shall be conducted on the composite sample.

C-4.3 Tests for bacteriological requirements shall be conducted, on each of the samples constituting a set of test samples label led with the words ‘For Microbiological Examination’.

C-5 CRITERIA FOR CONFORMITY

C-5.1 The lot shall be declared as conforming to all the requirements of the specification of **C-5.1.1** and **C-5.1.3** are satisfied.

C-5.1.1 The test results on each of the individual samples for determination of requirements given in **C-4.1** shall satisfy the corresponding specification requirements.

C-5.1.2 The test results on the composite samples for flavour and odour and titratable acidity shall satisfy the corresponding specification requirements.

C-5.1.3 The test results for bacteriological specifications shall satisfy the corresponding requirements.

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Dairy Products and Equipment Sectional Committee, FAD 19

Organization	*Representative(s)*
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Confederation of Indian Industry, New Delhi	Ms Neha Aggarwal Ms Arti Gupta (*Alternate*)
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Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
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Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
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